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A pattern recognition system and process that can be used stand alone or in combination with an existing system. The pattern recognition system allows for error free classification of all members of the training set of objects, and then applies the inventive system to unclassified objects. The system and process involve selecting and measuring parameters and/or features of the data objects in a training set, selecting and computing discriminants from the measured data. That data is plotted in the discriminant space and a decision boundary or threshold is determined. In one preferred embodiment the threshold is selected so that at least one object from one class is isolated from the remaining objects. That classified object is then removed from the training set and the process is repeated until all or some acceptable number of unclassified objects remain. The system can be applied sequentially to classify all the members of the training set belonging to one class and then applied to objects in other classes. The system can be applied to fuzzy problems where the decision is that the likelihood of an object belonging to a class is determined. That determination may be a maximum or a minimum or something in between. The present invention can also be applied to optical systems using optical Fourier transforms where the positions of the objects are retained in addition to the classifications of those objects. In this embodiment, masks or Fourier filters and optical sensors are used, and the inventive system is not limited to linearly discriminable problems.